FIG. 1

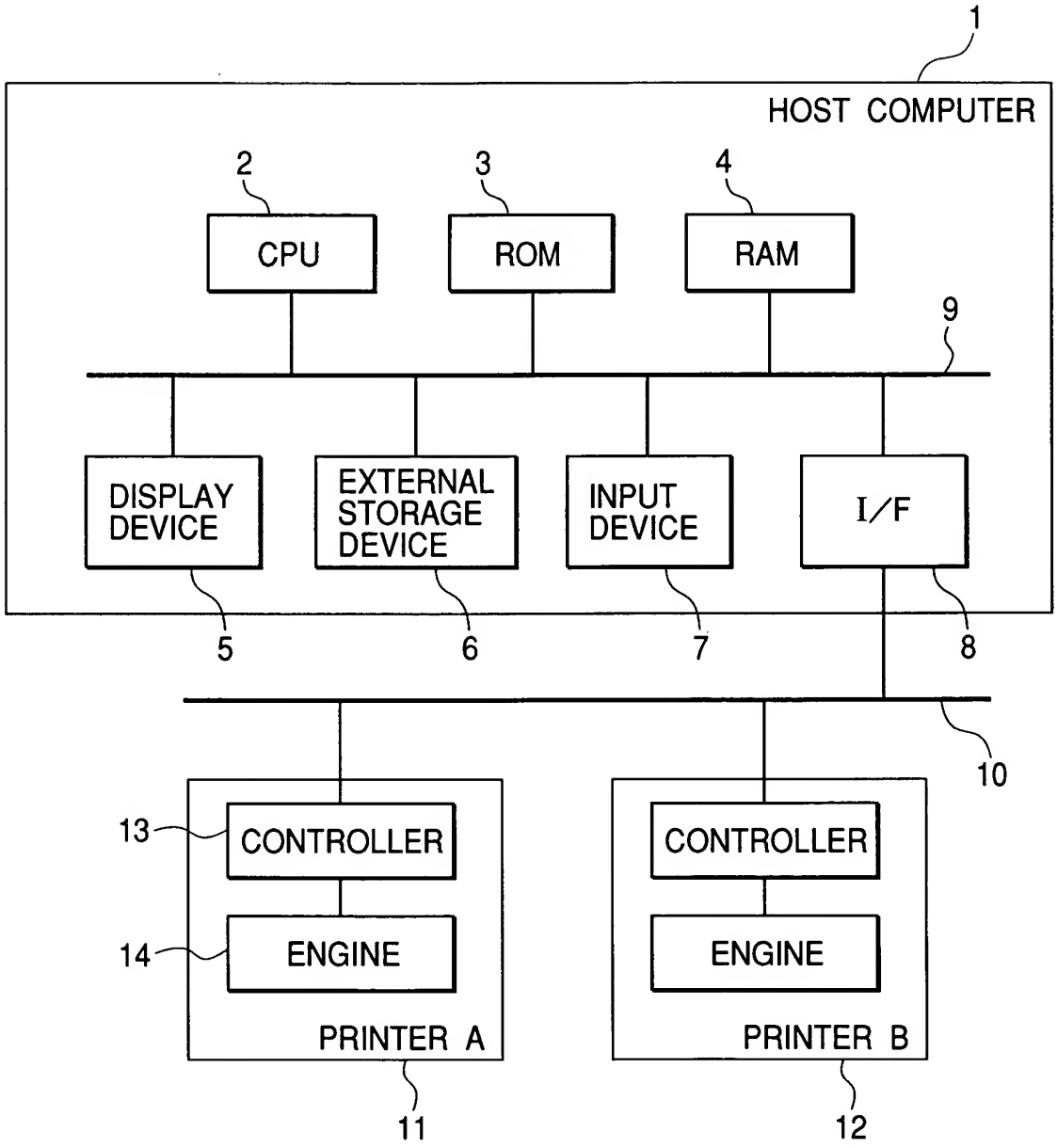
1
HOST COMPUTER
2
CPU
3
ROM
4
RAM
9
DISPLAY DEVICE
EXTERNAL STORAGE DEVICE
INPUT DEVICE
I/F
5
6
7
8
10
13
CONTROLLER
14
ENGINE
PRINTER A
CONTROLLER
ENGINE
PRINTER B
11
12

FIG. 2

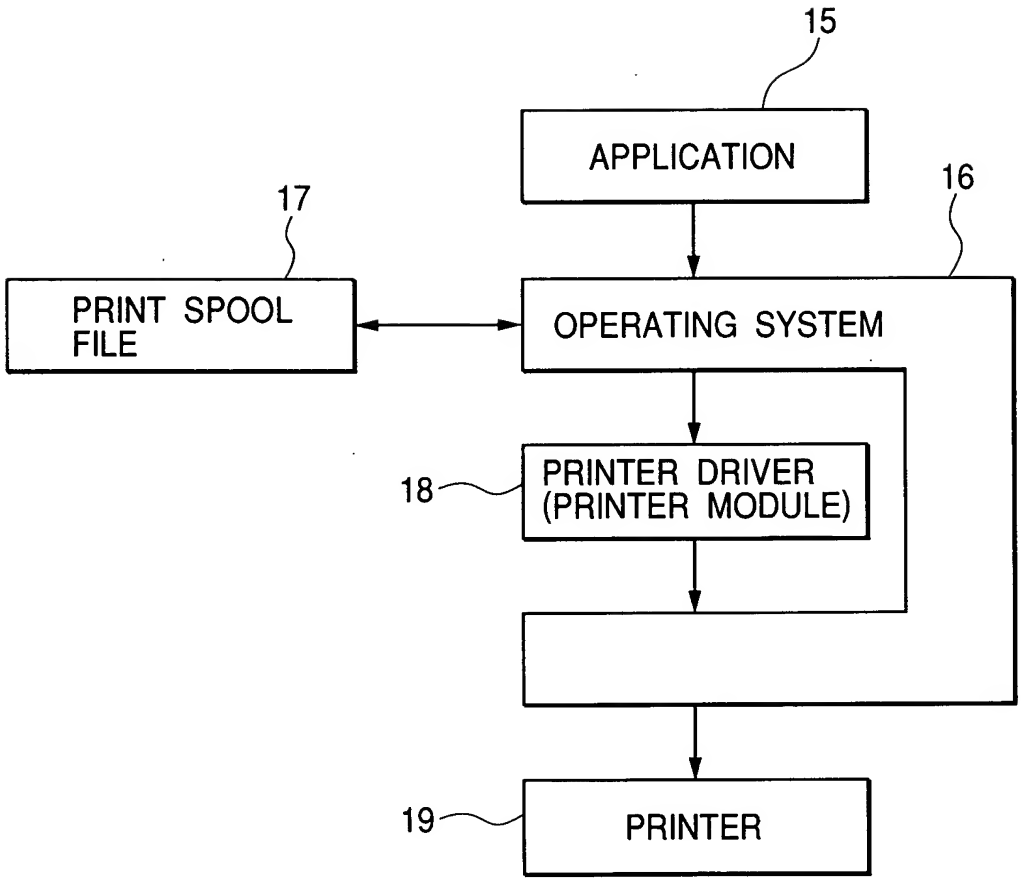
15
APPLICATION
16
17
PRINT SPOOL FILE
OPERATING SYSTEM
18
PRINTER DRIVER (PRINTER MODULE)
19
PRINTER

FIG. 3

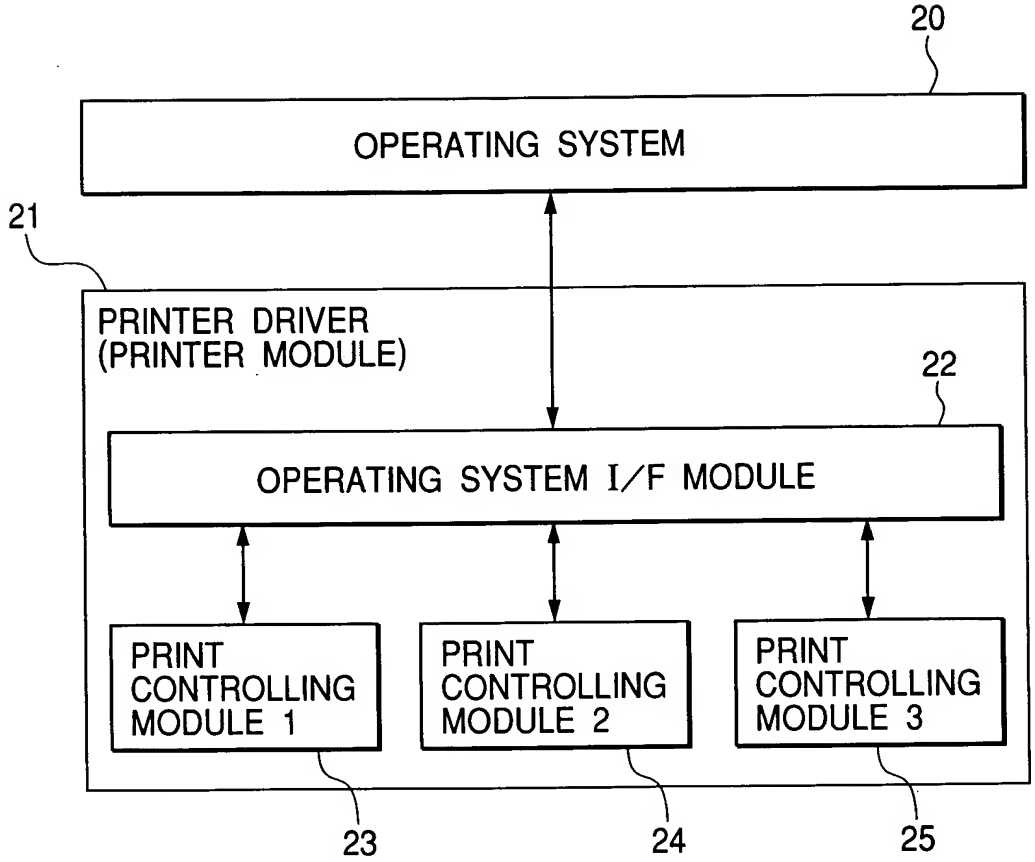
20
OPERATING SYSTEM
21
PRINTER DRIVER
(PRINTER MODULE)
22
OPERATING SYSTEM I/F MODULE
PRINT CONTROLLING MODULE 1
PRINT CONTROLLING MODULE 2
PRINT CONTROLLING MODULE 3
23
24
25

FIG. 4

PRINT CONTROLLING MODULE	VERSION NUMBER	SUPPORTED PRINTER
PRINT CONTROLLING MODULE 1	1.0.0	PRINTER A PRINTER B PRINTER C
PRINT CONTROLLING MODULE 2	2.0.0	PRINTER A PRINTER B PRINTER D
PRINT CONTROLLING MODULE 3	3.0.0	PRINTER A PRINTER E

FIG. 5

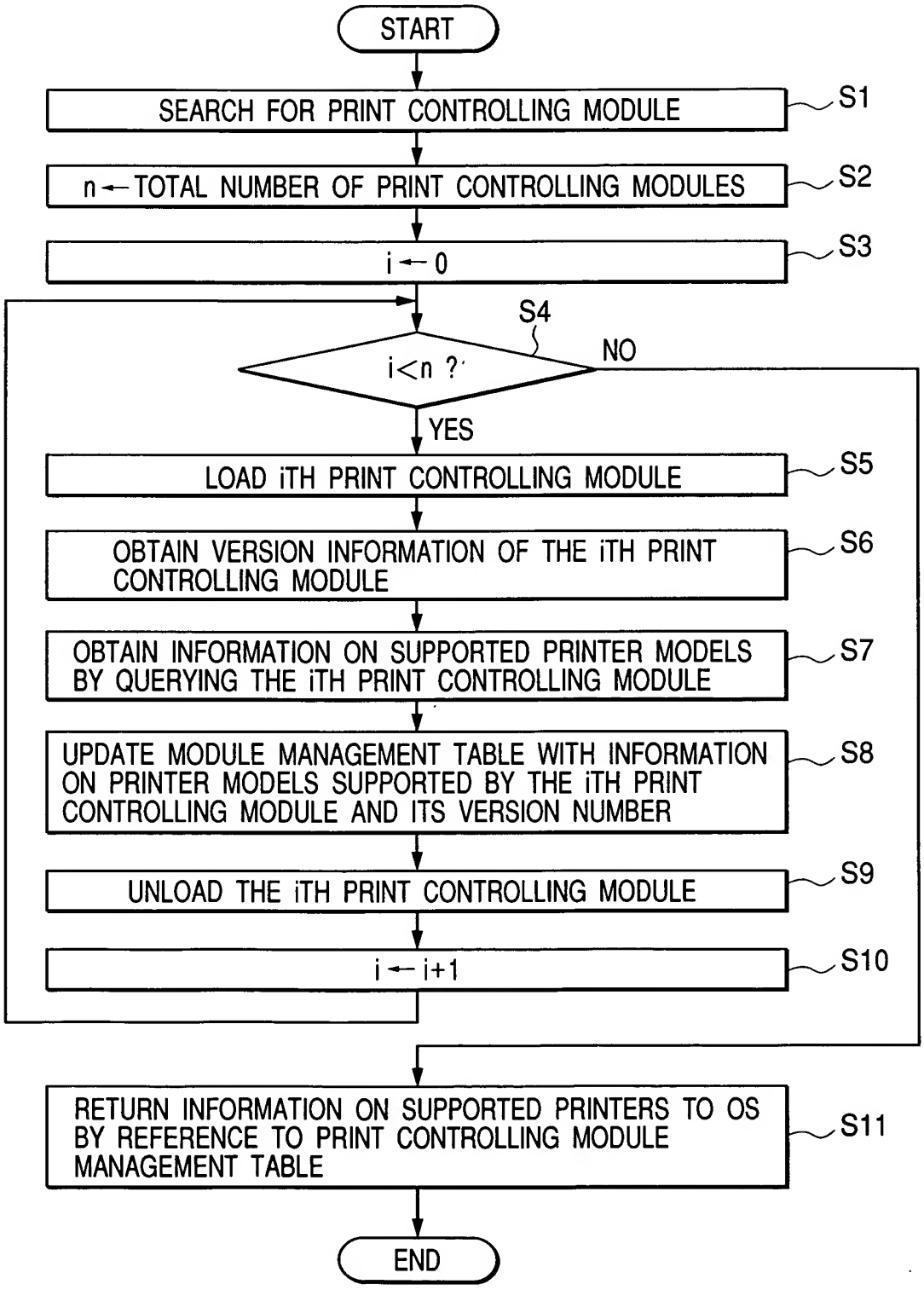
START
SEARCH FOR PRINT CONTROLLING MODULE
S1
n ← TOTAL NUMBER OF PRINT CONTROLLING MODULES
S2
i ← 0
S3
S4
i<n ?
NO
YES
LOAD iTH PRINT CONTROLLING MODULE
S5
OBTAIN VERSION INFORMATION OF THE iTH PRINT CONTROLLING MODULE
S6
OBTAIN INFORMATION ON SUPPORTED PRINTER MODELS BY QUERYING THE iTH PRINT CONTROLLING MODULE
S7
UPDATE MODULE MANAGEMENT TABLE WITH INFORMATION ON PRINTER MODELS SUPPORTED BY THE iTH PRINT CONTROLLING MODULE AND ITS VERSION NUMBER
S8
UNLOAD THE iTH PRINT CONTROLLING MODULE
S9
i ← i+1
S10
RETURN INFORMATION ON SUPPORTED PRINTERS TO OS BY REFERENCE TO PRINT CONTROLLING MODULE MANAGEMENT TABLE
S11
END

FIG. 6

PRINTER	VERSION INFORMATION	PRINT CONTROLLING MODULE IDENTIFICATION INFORMATION
PRINTER A	3.0.0	PRINT CONTROLLING MODULE 3
PRINTER B	2.0.0	PRINT CONTROLLING MODULE 2
PRINTER C	1.0.0	PRINT CONTROLLING MODULE 1
PRINTER D	2.0.0	PRINT CONTROLLING MODULE 2
PRINTER E	3.0.0	PRINT CONTROLLING MODULE 3

FIG. 7

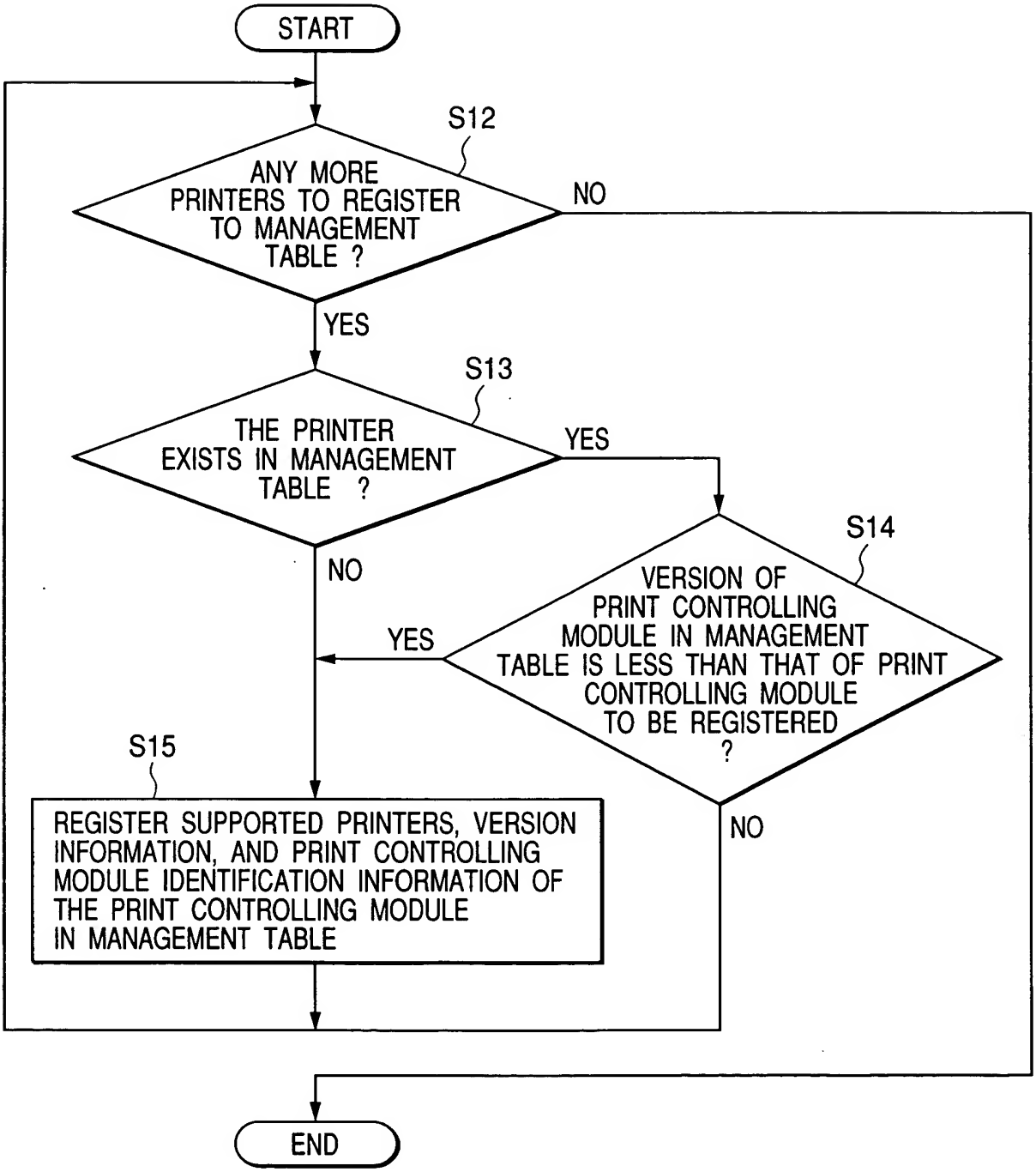
START
S12
ANY MORE PRINTERS TO REGISTER TO MANAGEMENT TABLE ?
NO
YES
S13
THE PRINTER EXISTS IN MANAGEMENT TABLE ?
YES
NO
S14
VERSION OF PRINT CONTROLLING MODULE IN MANAGEMENT TABLE IS LESS THAN THAT OF PRINT CONTROLLING MODULE TO BE REGISTERED ?
YES
NO
S15
REGISTER SUPPORTED PRINTERS, VERSION INFORMATION, AND PRINT CONTROLLING MODULE IDENTIFICATION INFORMATION OF THE PRINT CONTROLLING MODULE IN MANAGEMENT TABLE
END

FIG. 8

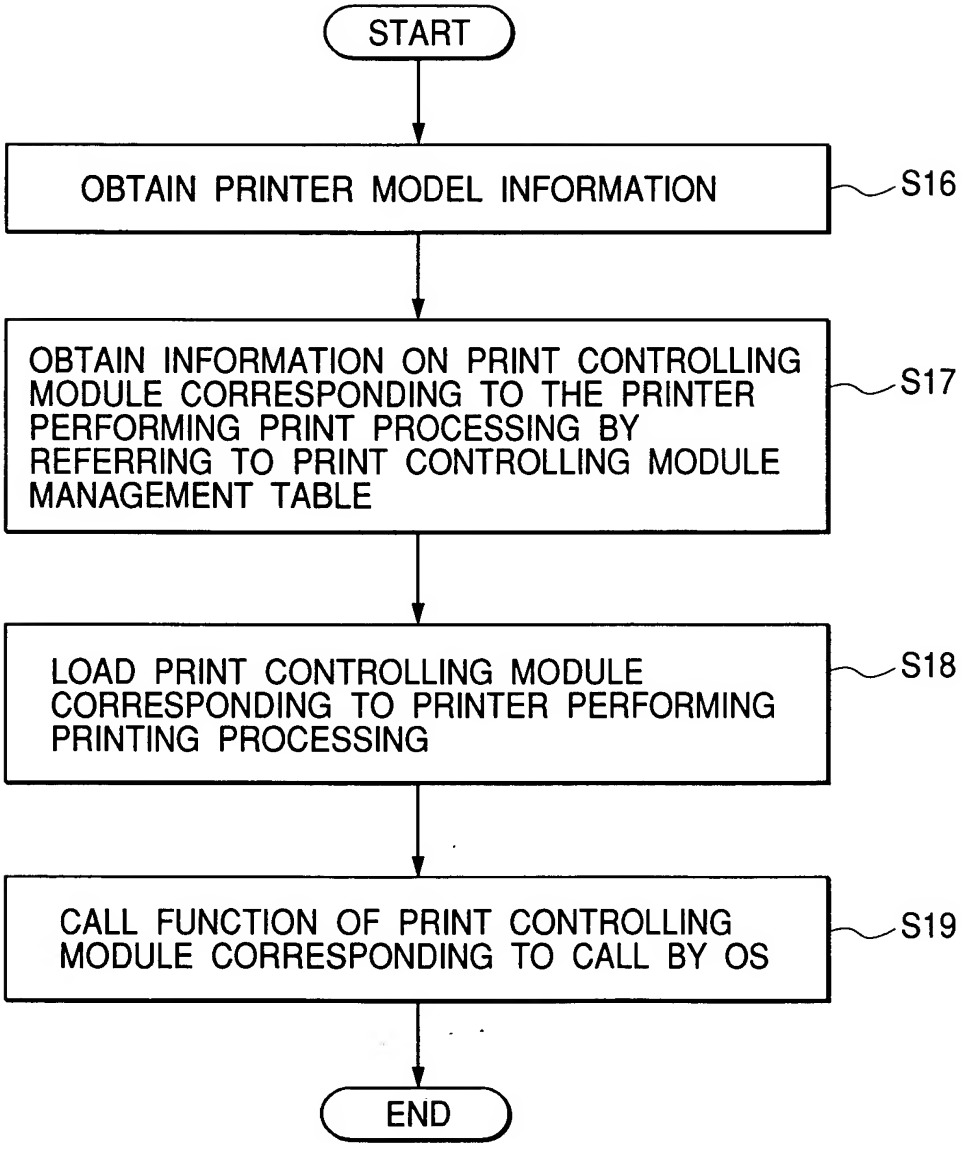
START
OBTAIN PRINTER MODEL INFORMATION
S16
OBTAIN INFORMATION ON PRINT CONTROLLING MODULE CORRESPONDING TO THE PRINTER PERFORMING PRINT PROCESSING BY REFERRING TO PRINT CONTROLLING MODULE MANAGEMENT TABLE
S17
LOAD PRINT CONTROLLING MODULE CORRESPONDING TO PRINTER PERFORMING PRINTING PROCESSING
S18
CALL FUNCTION OF PRINT CONTROLLING MODULE CORRESPONDING TO CALL BY OS
S19
END

FIG. 9

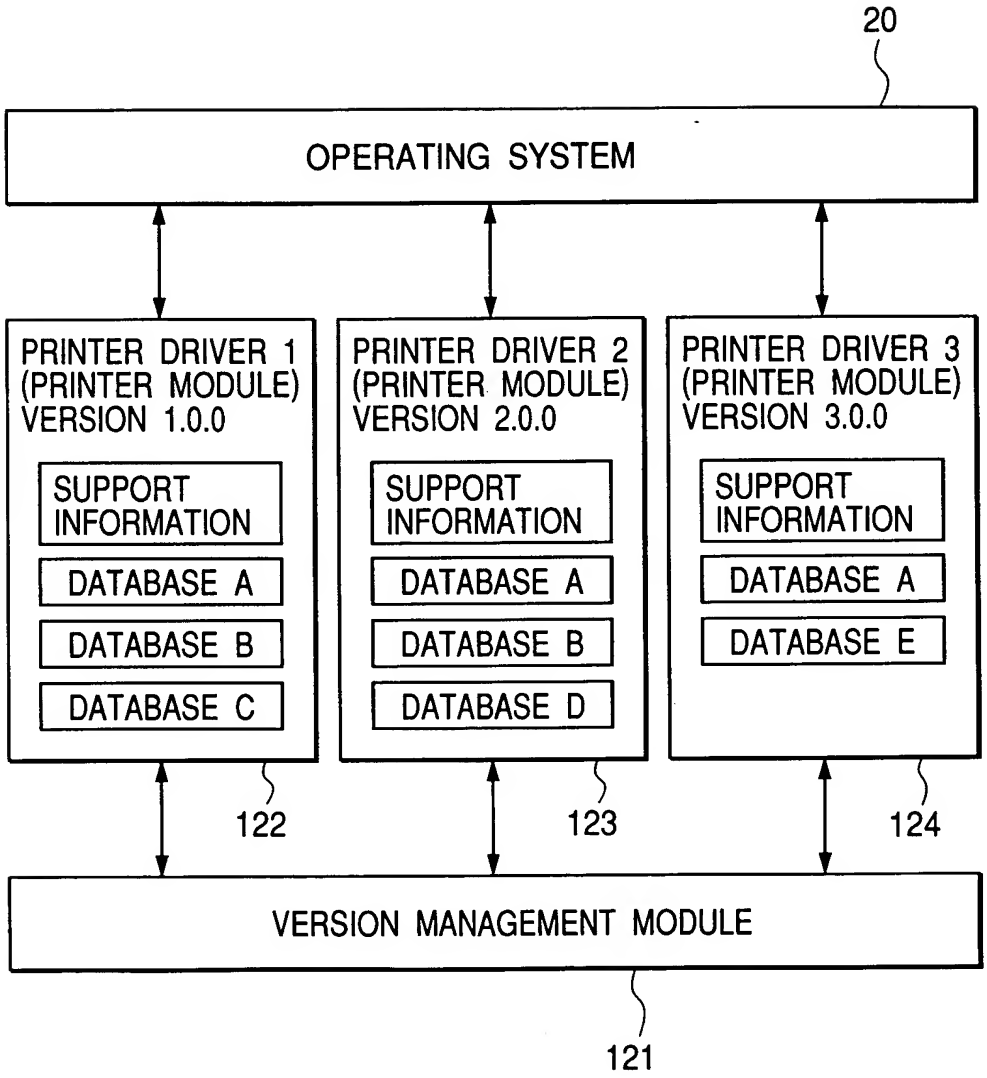
20
OPERATING SYSTEM
PRINTER DRIVER 1
(PRINTER MODULE)
VERSION 1.0.0
SUPPORT INFORMATION
DATABASE A
DATABASE B
DATABASE C
PRINTER DRIVER 2
(PRINTER MODULE)
VERSION 2.0.0
SUPPORT INFORMATION
DATABASE A
DATABASE B
DATABASE D
PRINTER DRIVER 3
(PRINTER MODULE)
VERSION 3.0.0
SUPPORT INFORMATION
DATABASE A
DATABASE E
122
123
124
VERSION MANAGEMENT MODULE
121

FIG. 10

PRINTER MODULE	VERSION NUMBER	SUPPORT INFORMATION	
		SUPPORTED PRINTER	DATABASE FILE
PRINTER MODULE 1	1.0.0	PRINTER A PRINTER B PRINTER C	DATABASE A DATABASE B DATABASE C
PRINTER MODULE 2	2.0.0	PRINTER A PRINTER B PRINTER D	DATABASE A DATABASE B DATABASE D
PRINTER MODULE 3	3.0.0	PRINTER A PRINTER E	DATABASE A DATABASE E

FIG. 11

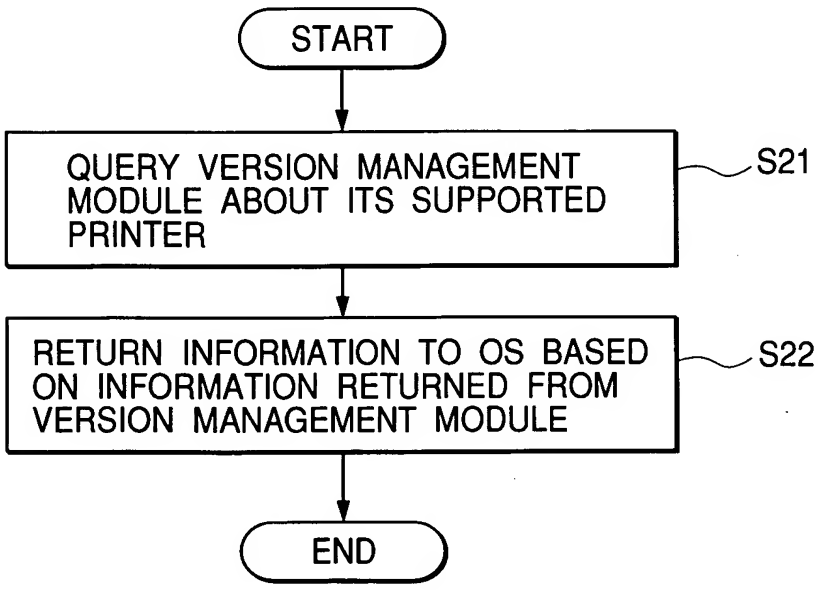

FIG. 12

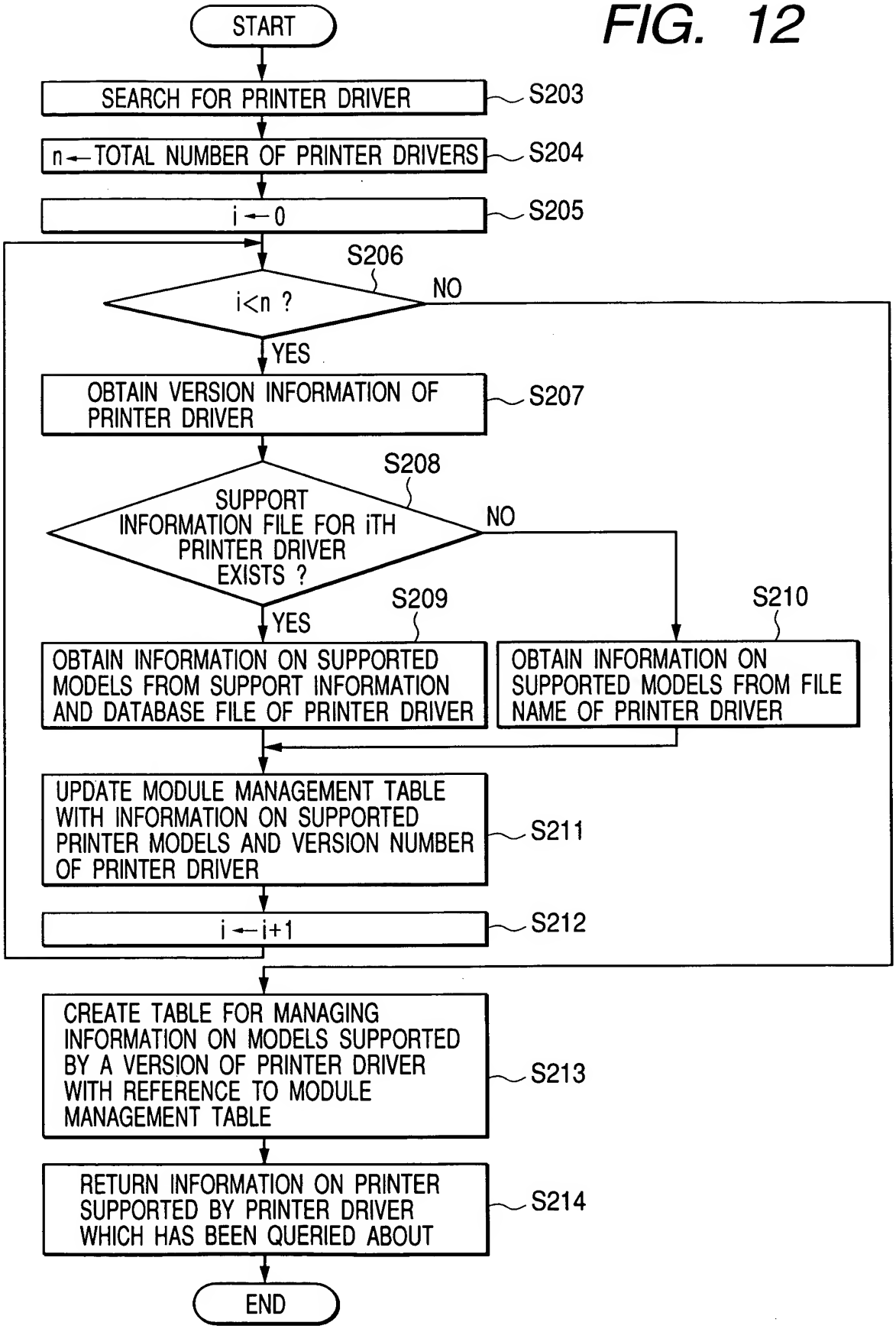
START
SEARCH FOR PRINTER DRIVER
S203
n←TOTAL NUMBER OF PRINTER DRIVERS
S204
i←0
S205
S206
i<n ?
NO
YES
OBTAIN VERSION INFORMATION OF PRINTER DRIVER
S207
S208
SUPPORT INFORMATION FILE FOR iTH PRINTER DRIVER EXISTS ?
NO
YES
S209
S210
OBTAIN INFORMATION ON SUPPORTED MODELS FROM SUPPORT INFORMATION AND DATABASE FILE OF PRINTER DRIVER
OBTAIN INFORMATION ON SUPPORTED MODELS FROM FILE NAME OF PRINTER DRIVER
UPDATE MODULE MANAGEMENT TABLE WITH INFORMATION ON SUPPORTED PRINTER MODELS AND VERSION NUMBER OF PRINTER DRIVER
S211
i←i+1
S212
CREATE TABLE FOR MANAGING INFORMATION ON MODELS SUPPORTED BY A VERSION OF PRINTER DRIVER WITH REFERENCE TO MODULE MANAGEMENT TABLE
S213
RETURN INFORMATION ON PRINTER SUPPORTED BY PRINTER DRIVER WHICH HAS BEEN QUERIED ABOUT
S214
END

FIG. 13

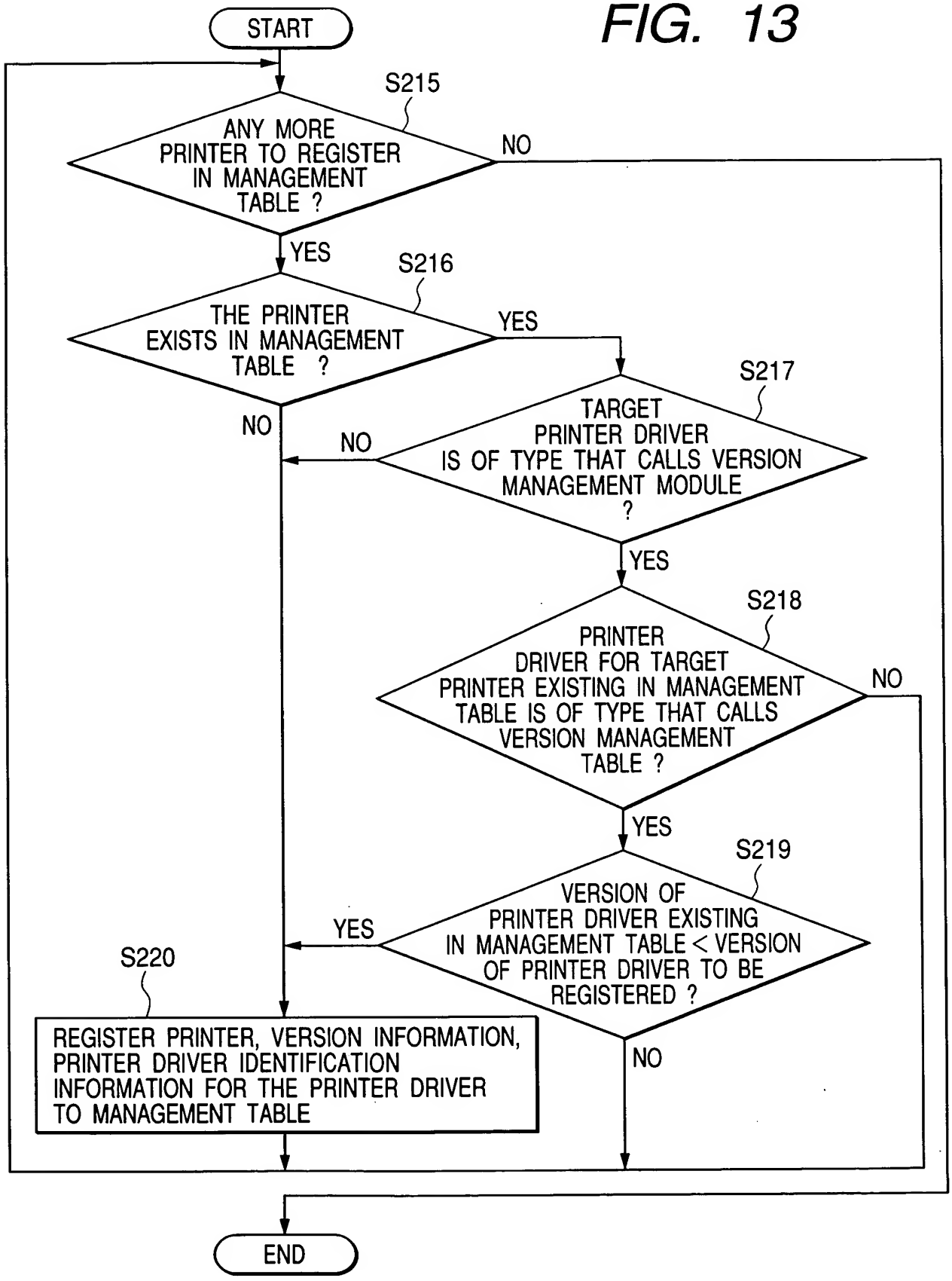
START
S215
ANY MORE PRINTER TO REGISTER IN MANAGEMENT TABLE ?
NO
YES
S216
THE PRINTER EXISTS IN MANAGEMENT TABLE ?
YES
NO
S217
TARGET PRINTER DRIVER IS OF TYPE THAT CALLS VERSION MANAGEMENT MODULE ?
NO
YES
S218
PRINTER DRIVER FOR TARGET PRINTER EXISTING IN MANAGEMENT TABLE IS OF TYPE THAT CALLS VERSION MANAGEMENT TABLE ?
NO
YES
S219
VERSION OF PRINTER DRIVER EXISTING IN MANAGEMENT TABLE < VERSION OF PRINTER DRIVER TO BE REGISTERED ?
YES
NO
S220
REGISTER PRINTER, VERSION INFORMATION, PRINTER DRIVER IDENTIFICATION INFORMATION FOR THE PRINTER DRIVER TO MANAGEMENT TABLE
END

FIG. 14

PRINTER	VERSION NUMBER	CORRESPONDENCE TO VERSION MANAGEMENT MODULE	PRINTER DRIVER IDENTIFICATION INFORMATION
PRINTER A	3.0.0	○	PRINTER DRIVER 3
PRINTER B	2.0.0	○	PRINTER DRIVER 2
PRINTER C	1.0.0	○	PRINTER DRIVER 1
PRINTER D	2.0.0	○	PRINTER DRIVER 2
PRINTER E	3.0.0	○	PRINTER DRIVER 3

FIG. 15

PRINTER	VERSION NUMBER	CORRESPONDENCE TO VERSION MANAGEMENT MODULE	PRINTER DRIVER IDENTIFICATION INFORMATION
PRINTER A	0.5.0	×	PRINTER DRIVER 4
PRINTER B	2.0.0	○	PRINTER DRIVER 2
PRINTER C	1.0.0	○	PRINTER DRIVER 1
PRINTER D	2.0.0	○	PRINTER DRIVER 2
PRINTER E	3.0.0	○	PRINTER DRIVER 3

FIG. 16

PRINTER DRIVER	VERSION NUMBER	SUPPORTED PRINTER
PRINTER DRIVER 1	1.0.0	PRINTER C
PRINTER DRIVER 2	2.0.0	PRINTER B PRINTER D
PRINTER DRIVER 3	3.0.0	PRINTER A PRINTER E

FIG. 17

PRINTER DRIVER	VERSION NUMBER	SUPPORTED PRINTER
PRINTER DRIVER 1	1.0.0	PRINTER C
PRINTER DRIVER 2	2.0.0	PRINTER B PRINTER D
PRINTER DRIVER 3	3.0.0	PRINTER E

FIG. 18

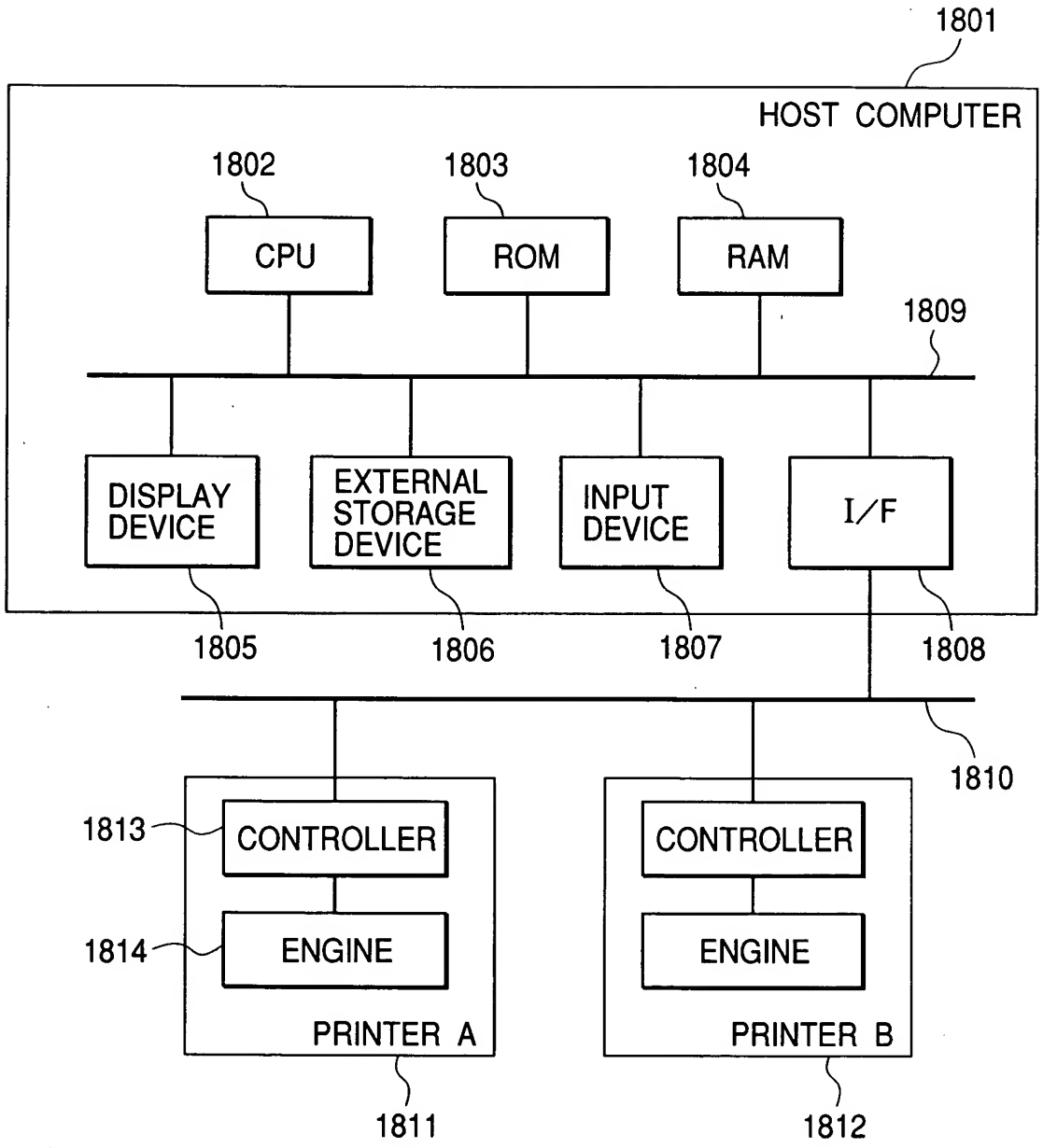
1801
HOST COMPUTER
1802
1803
1804
CPU
ROM
RAM
1809
DISPLAY DEVICE
EXTERNAL STORAGE DEVICE
INPUT DEVICE
I/F
1805
1806
1807
1808
1810
1813
CONTROLLER
1814
ENGINE
PRINTER A
CONTROLLER
ENGINE
PRINTER B
1811
1812

FIG. 19

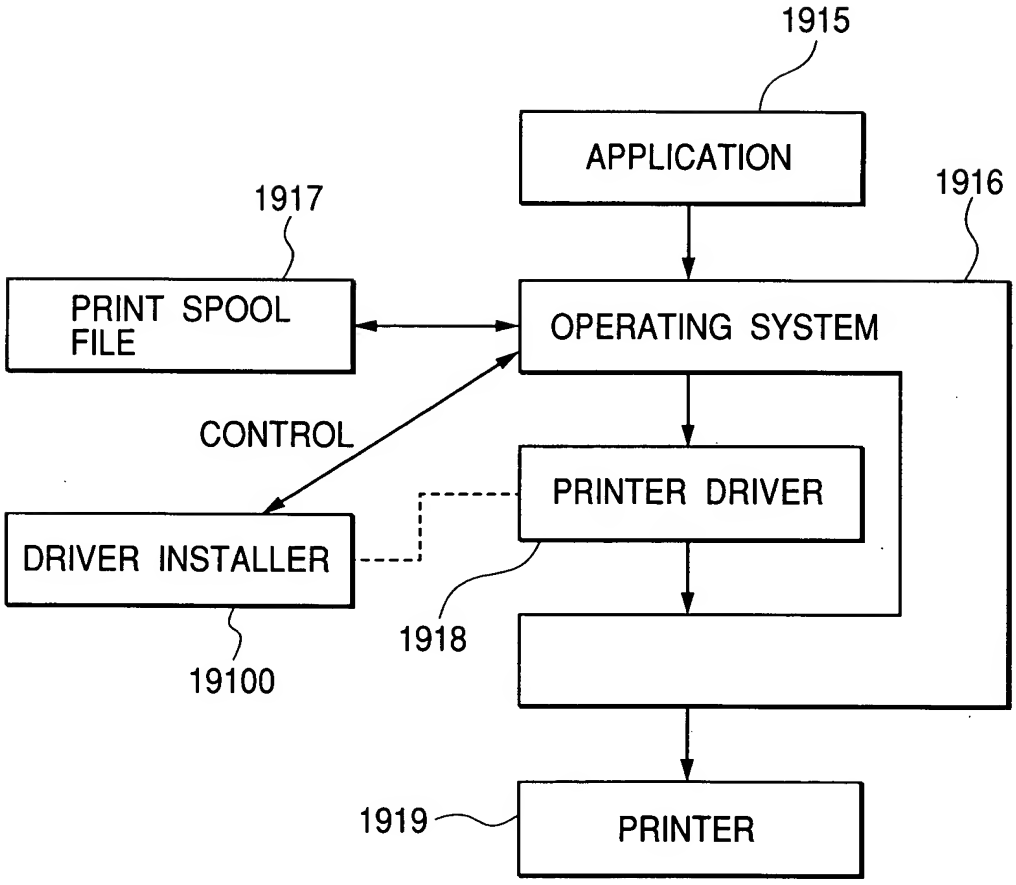
1915
APPLICATION
1916
1917
PRINT SPOOL FILE
OPERATING SYSTEM
CONTROL
PRINTER DRIVER
DRIVER INSTALLER
1918
19100
1919
PRINTER

FIG. 20

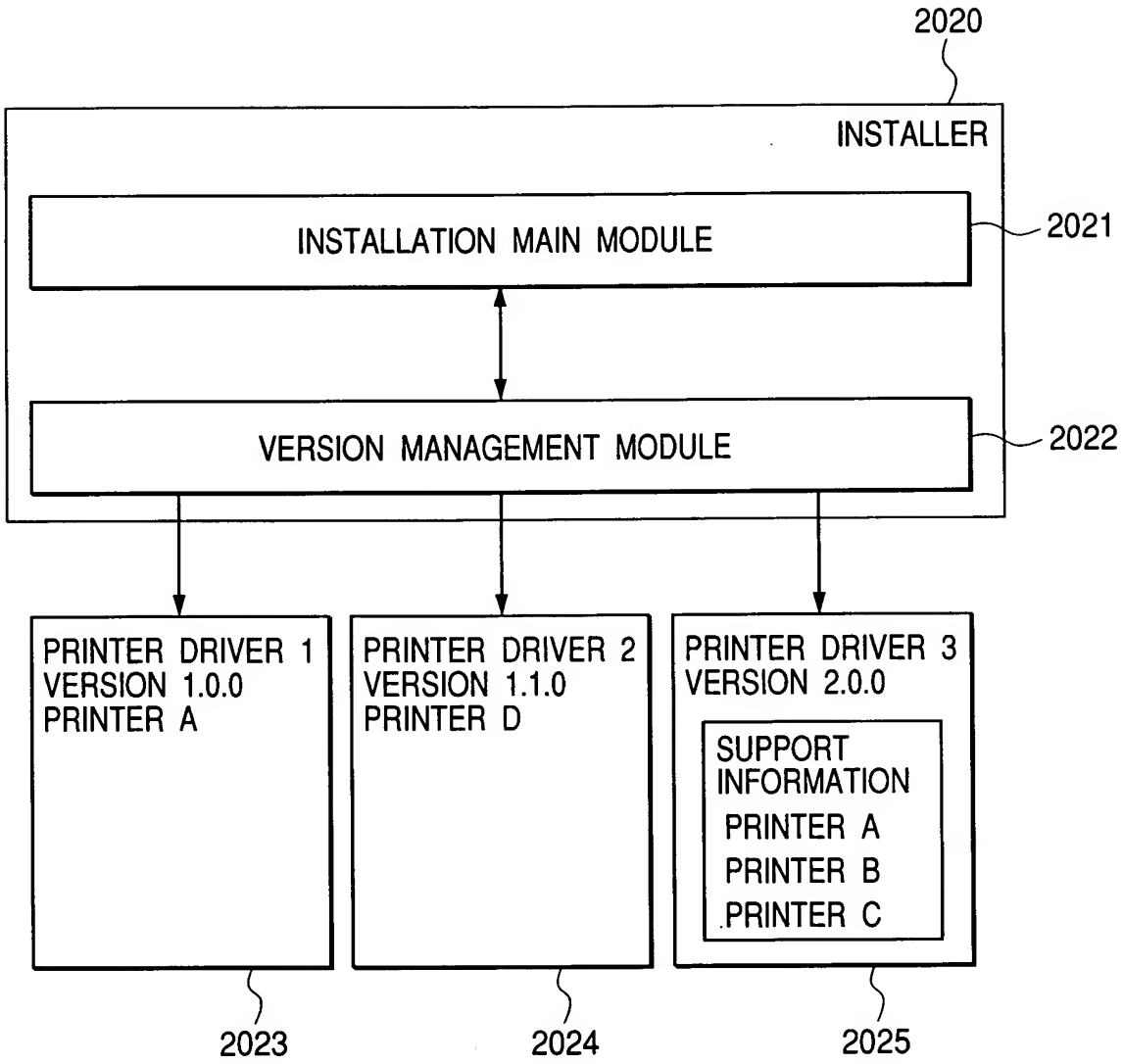
2020
INSTALLER
INSTALLATION MAIN MODULE
2021
VERSION MANAGEMENT MODULE
2022
PRINTER DRIVER 1
VERSION 1.0.0
PRINTER A
PRINTER DRIVER 2
VERSION 1.1.0
PRINTER D
PRINTER DRIVER 3
VERSION 2.0.0
SUPPORT INFORMATION
PRINTER A
PRINTER B
PRINTER C
2023
2024
2025

FIG. 21

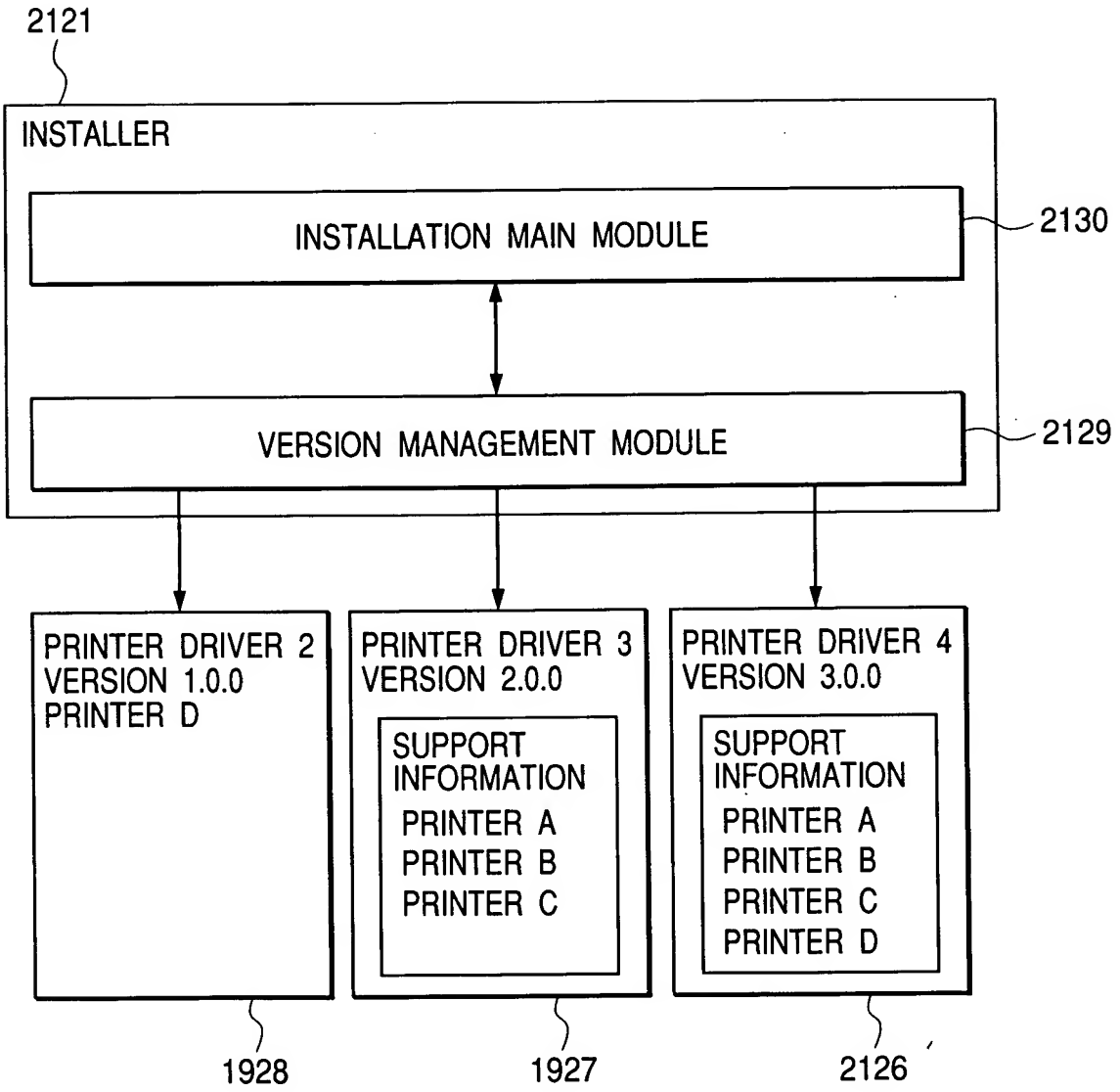
2121
INSTALLER
INSTALLATION MAIN MODULE
2130
VERSION MANAGEMENT MODULE
2129
PRINTER DRIVER 2
VERSION 1.0.0
PRINTER D
PRINTER DRIVER 3
VERSION 2.0.0
SUPPORT INFORMATION
PRINTER A
PRINTER B
PRINTER C
PRINTER DRIVER 4
VERSION 3.0.0
SUPPORT INFORMATION
PRINTER A
PRINTER B
PRINTER C
PRINTER D
1928
1927
2126

FIG. 22

PRINTER DRIVER	VERSION NUMBER	SUPPORT INFORMATION	
		NUMBER OF SUPPORTED MODELS	SUPPORTED PRINTER
PRINTER DRIVER 3	2.0.0	3	PRINTER A PRINTER B PRINTER C
PRINTER DRIVER 4	3.0.0	4	PRINTER A PRINTER B PRINTER C PRINTER D

FIG. 23

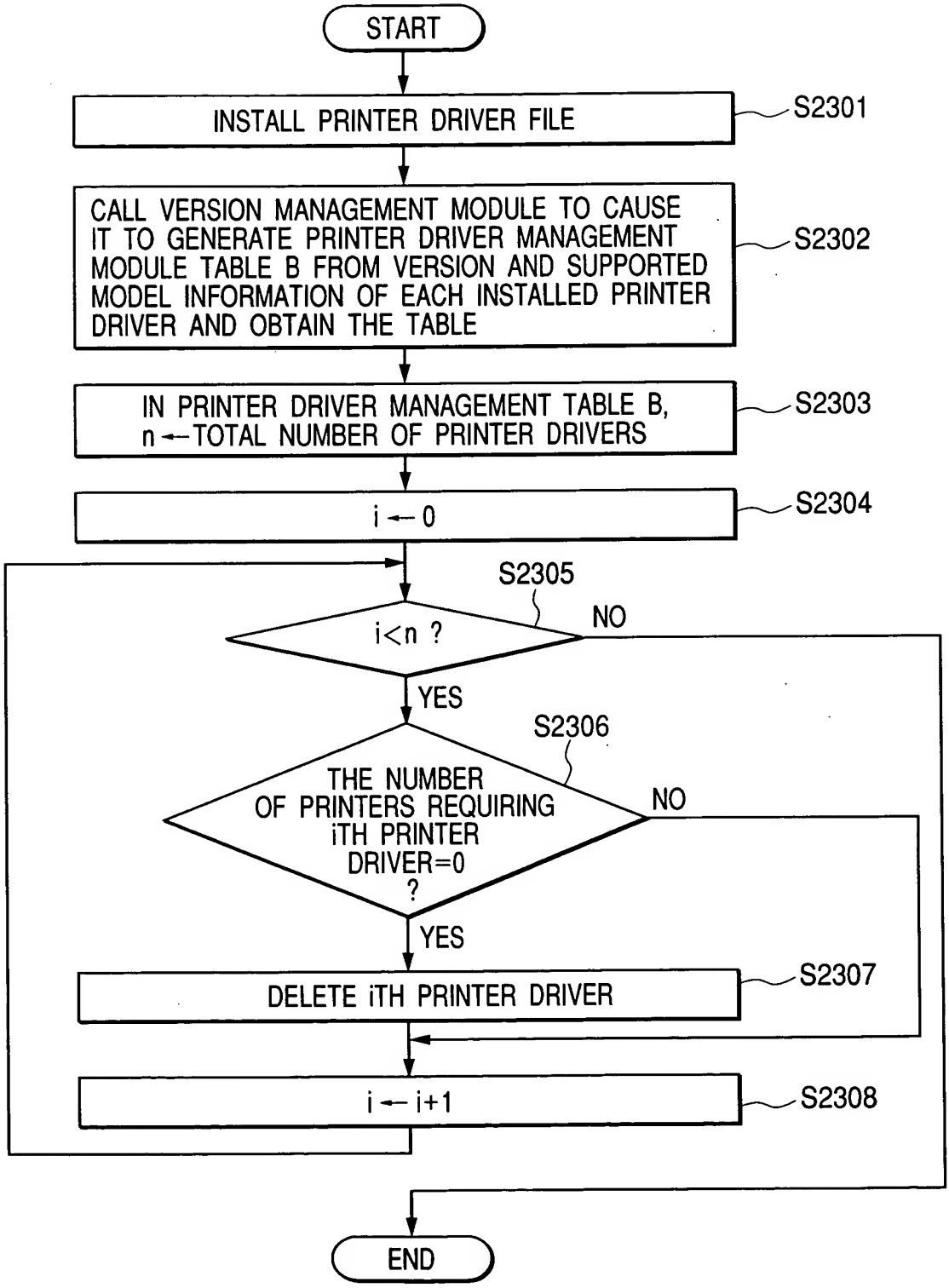
START
INSTALL PRINTER DRIVER FILE
S2301
CALL VERSION MANAGEMENT MODULE TO CAUSE IT TO GENERATE PRINTER DRIVER MANAGEMENT MODULE TABLE B FROM VERSION AND SUPPORTED MODEL INFORMATION OF EACH INSTALLED PRINTER DRIVER AND OBTAIN THE TABLE
S2302
IN PRINTER DRIVER MANAGEMENT TABLE B, n←TOTAL NUMBER OF PRINTER DRIVERS
S2303
i←0
S2304
S2305
i<n ?
NO
YES
S2306
THE NUMBER OF PRINTERS REQUIRING iTH PRINTER DRIVER=0 ?
NO
YES
DELETE iTH PRINTER DRIVER
S2307
i←i+1
S2308
END

FIG. 24

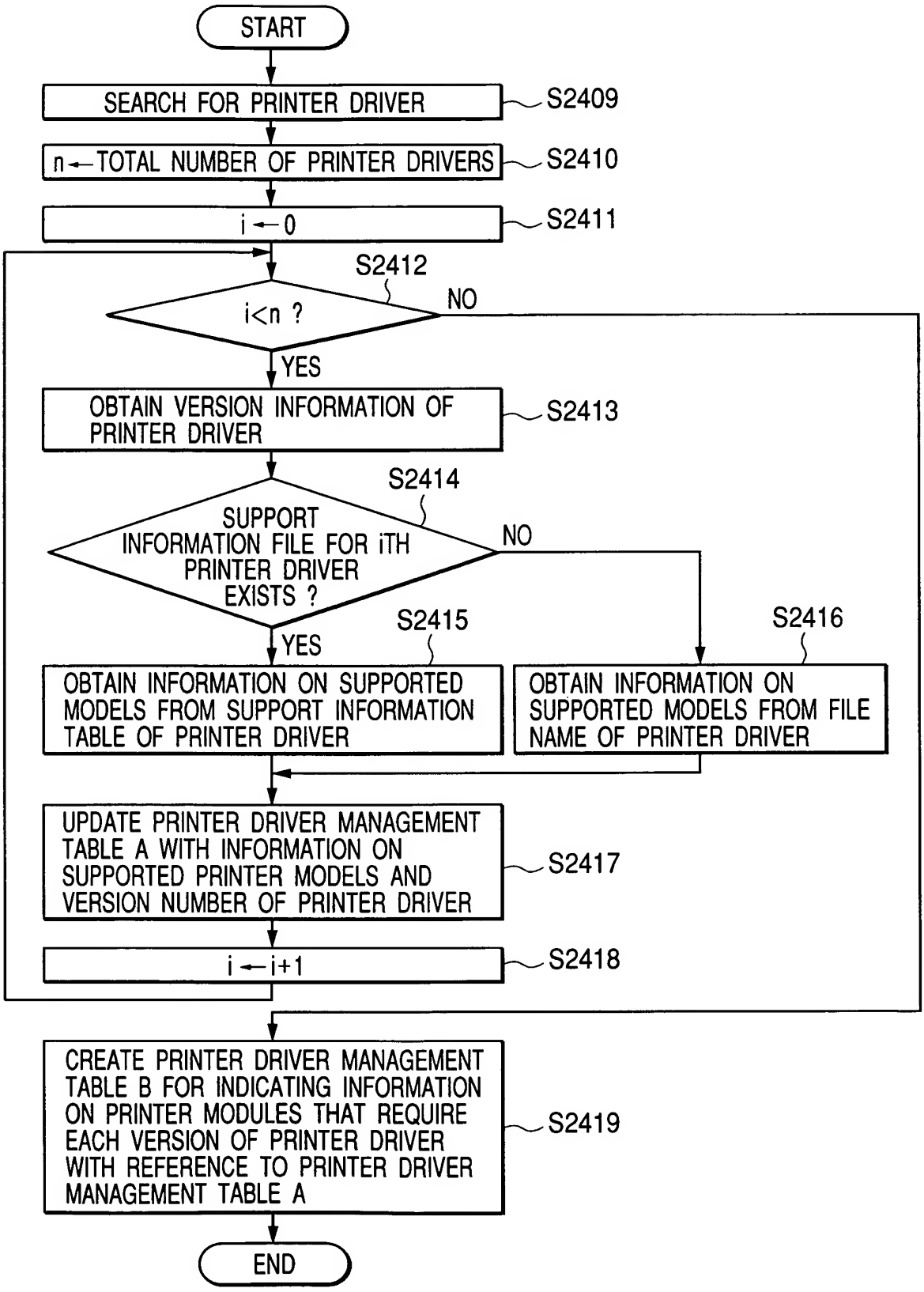
START
SEARCH FOR PRINTER DRIVER
S2409
n←TOTAL NUMBER OF PRINTER DRIVERS
S2410
i←0
S2411
S2412
i<n ?
NO
YES
OBTAIN VERSION INFORMATION OF PRINTER DRIVER
S2413
S2414
SUPPORT INFORMATION FILE FOR iTH PRINTER DRIVER EXISTS ?
NO
YES
S2415
S2416
OBTAIN INFORMATION ON SUPPORTED MODELS FROM SUPPORT INFORMATION TABLE OF PRINTER DRIVER
OBTAIN INFORMATION ON SUPPORTED MODELS FROM FILE NAME OF PRINTER DRIVER
UPDATE PRINTER DRIVER MANAGEMENT TABLE A WITH INFORMATION ON SUPPORTED PRINTER MODELS AND VERSION NUMBER OF PRINTER DRIVER
S2417
i←i+1
S2418
CREATE PRINTER DRIVER MANAGEMENT TABLE B FOR INDICATING INFORMATION ON PRINTER MODULES THAT REQUIRE EACH VERSION OF PRINTER DRIVER WITH REFERENCE TO PRINTER DRIVER MANAGEMENT TABLE A
S2419
END

FIG. 25

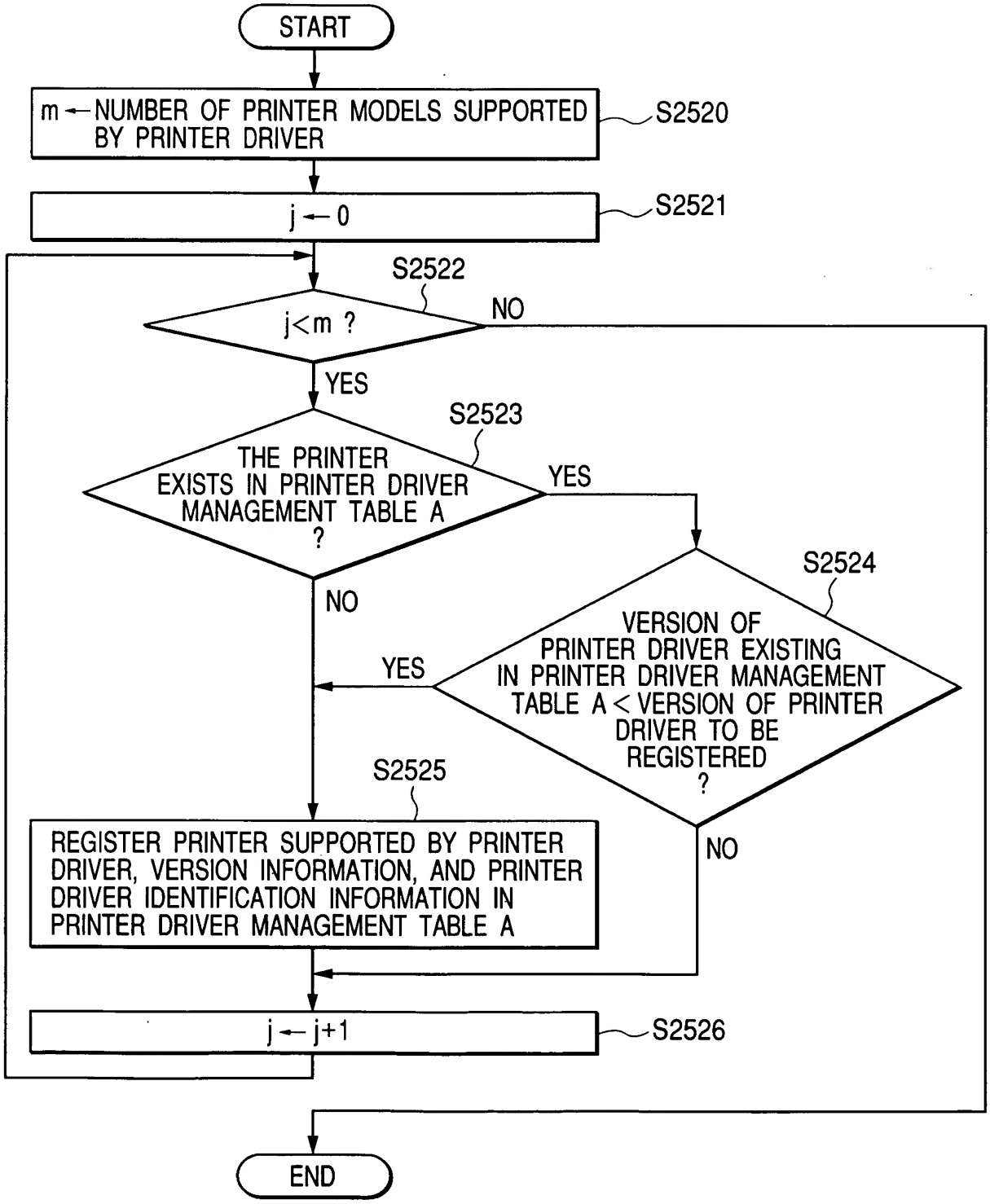
START
m ← NUMBER OF PRINTER MODELS SUPPORTED BY PRINTER DRIVER
S2520
j ← 0
S2521
S2522
j<m ?
NO
YES
S2523
THE PRINTER EXISTS IN PRINTER DRIVER MANAGEMENT TABLE A ?
YES
S2524
VERSION OF PRINTER DRIVER EXISTING IN PRINTER DRIVER MANAGEMENT TABLE A < VERSION OF PRINTER DRIVER TO BE REGISTERED ?
NO
YES
NO
S2525
REGISTER PRINTER SUPPORTED BY PRINTER DRIVER, VERSION INFORMATION, AND PRINTER DRIVER IDENTIFICATION INFORMATION IN PRINTER DRIVER MANAGEMENT TABLE A
j ← j+1
S2526
END

FIG. 26

PRINTER	VERSION INFORMATION	PRINTER DRIVER IDENTIFICATION INFORMATION
PRINTER A	2.0.0	PRINTER DRIVER 3
PRINTER B	2.0.0	PRINTER DRIVER 3
PRINTER C	2.0.0	PRINTER DRIVER 3
PRINTER D	1.1.0	PRINTER DRIVER 2

FIG. 27

PRINTER	VERSION INFORMATION	PRINTER DRIVER IDENTIFICATION INFORMATION
PRINTER A	3.0.0	PRINTER DRIVER 4
PRINTER B	3.0.0	PRINTER DRIVER 4
PRINTER C	3.0.0	PRINTER DRIVER 4
PRINTER D	3.0.0	PRINTER DRIVER 4

FIG. 28

PRINTER DRIVER IDENTIFICATION INFORMATION	VERSION NUMBER	NUMBER OF PRINTER MODELS	PRINTER
PRINTER DRIVER 1	1.0.0	0	NONE
PRINTER DRIVER 2	1.1.0	1	PRINTER D
PRINTER DRIVER 3	2.0.0	3	PRINTER A PRINTER B PRINTER C

FIG. 29

PRINTER DRIVER IDENTIFICATION INFORMATION	VERSION NUMBER	NUMBER OF PRINTER MODELS	PRINTER
PRINTER DRIVER 2	1.1.0	0	NONE
PRINTER DRIVER 3	2.0.0	0	NONE
PRINTER DRIVER 4	3.0.0	4	PRINTER A PRINTER B PRINTER C PRINTER D